ABSTRACT OF THE DISCLOSURE

A wireless cellular communication system in which cellular base stations utilize multi-beam antenna to communicate with a large number of users. Each of the base station beams is a narrow beam of less than 10 degrees permitting reuse of available spectrum many times. A preferred antenna is described which broadcasts about 12 simultaneous beams, each about 5 degree, the 12 beams together covering a fan arc of about 60 degrees with the beams overlapping somewhat but interference is avoided by having adjacent beams broadcast at different frequencies within an authorized broadcast bandwidth. Six antennae mounted in a hexagonal manner thus cover a 360-degree azimuthal range. Preferably, users of the system communicate with the base station using a single narrow beam antenna directed at the base station. Since all beam are narrow beams many base stations may be located in the same cellular region permitting more than an order of magnitude increase in the utilization of available bandwidth and permitting a huge increase in bandwidth per customer. In a preferred embodiment the base stations communicate with a central office via a narrow-beam millimeter wave trunk line. The transceivers are equipped with antennas providing beam divergence small enough to ensure efficient spatial and directional partitioning of the data channels so that an almost unlimited number of point-to-point transceivers will be able to simultaneously use the same millimeter wave spectrum.

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